The Office Action on page 4, Item 4, states that "$2n/\lambda$" on page 14, line 25, should be corrected to --$2n\lambda/4$--. In response, the Specification (page 14, lines 19-27) has been amended to clarify the description that at each 0 reflectance, the retardation is $(2n+1)\lambda/4$ and at each 0.9 reflectance, the retardation is $2n\lambda/4$.

The Office Action advises that should Claim 7 be found allowable, Claim 3 will be objected to under 37 C.F.R. §1.75 as being a substantial duplicate thereof. In response, Claim 3 has been cancelled.

Claims 1-4 and 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,266,116 (Ohta) in view of U.S. Patent No. 5,598,285 (Kondo). The "et al." suffix in each reference name is omitted in the Remarks.

The Office Action (page 3, Item 3) questions the accuracy of the of the previous claim amendment that λ includes all wavelengths in the visible light spectrum. If it is true, the Office Action asserts, the retardation $(2n+1)\lambda/4$ then can be of any value if λ includes all light wavelengths and "almost any liquid crystal layer will have a retardation value satisfying the claims' limitation." Office Action then makes a new rejection of the amended Claims 1 and 7 over Ohta in view of Kondo.

In response, Claims 1 and 7 have been amended to recite that the "retardation in the liquid crystal layer is caused to occur in the absence of a quarter wave plate for retarding incident light by $\lambda/4$ when the liquid crystal molecules in the liquid crystal layer are driven by the fringe field and wherein λ is **about 570 nm**.

Ohta and Kondo are substantially different from the presently claimed invention in that Ohta or Kondo, either alone or in combination, does not disclose, inter alia, a quarter wave retardation of liquid crystal molecules created by the fringe fields when λ is about 570

nm.

Further, it is respectfully emphasized that the present invention discloses that a liquid crystal having **a specific Δn in 570 nm** (that is, Δn(λ)) must be used **when λ is 570 nm** so that (2n+1)*λ/4 equals d*Δn(λ). This is different from the indication that a liquid crystal having a specific Δn that is irrelevant to the wavelength λ may be used.

Claim 1 stands rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,147,727 (Shigeno).

The Office Action states that the previously submitted argument that Shigeno fails to teach or suggest a reflective liquid crystal display that does not utilize an optical component such as a λ/4 wave plate is not persuasive since the Claims 1 and 7 were not amended to recite the limitation that the claimed device does not use an optical component such as a λ/4 wave plate.

In response, Claims 1 and 7 have been amended to recite such a limitation and therefore Applicants respectfully request that the previously submitted argument in response to the rejection based on Shigeno be considered persuasive.

It is noted that the Claims 1 and 7 have been amended to claim the absence of a λ/4 wave plate. As set forth in the Specification page 4, lines 23-27, the present invention does not require the use of a separate optical element for retardation. In contradistinction, Shigeno requires a λ/4 wave plate as a separate and additional optical element, and is thus distinguished.

In particular, the Shigeno reference discloses a conventional TN liquid crystal display that utilizes a λ/4 wavelength plate as an optical component (Shigeno col. 5, lines 60-65; Fig. 4, element 80) to solve problems associated with the contrast (i.e., the ratio between the white

display reflectivity and the black display reflectivity) of the display (Shigeno col. 2, lines 26-42). The Shigeno reference does not offer any solution to the problems associated with using the λ/4 wavelength plate affecting the increased manufacturing cost and the deteriorated transmissivity.

Shigeno fails to teach or suggest a reflective liquid crystal display that does not utilize an optical component (such as a λ/4 wavelength plate as claimed). Shigeno fails to teach or suggest, inter alia, the claimed element of a liquid crystal layer having a retardation value of λ/4 when the liquid crystal molecules in the liquid crystal layer are driven by the fringe field when the λ is 570 nm in the absence of a λ/4 plate, as amended.

Claims 1-2 and 5-6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,342,001 (Kwok) in view of U.S. Patent No. 6,323,927 (Hiroshi). Claims 4 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kwok in view of Hiroshi and further in view of U.S. Patent No. 6,184,957.

Applicants respectfully submit that the Kwok reference does not properly qualify as a prior art reference under 35 U.S.C. §103(a) (and/or §102(e)) as asserted in the Office Action, because the U.S. filing date (November 29, 1999) of that reference is after the priority date (June 29, 1999) of this application. It is noted that Applicants perfected the priority date by filing a certified copy of the Korean patent 1999-25214 on June 29, 2000.

The rejection of Claims 4 and 8 over Kwok in view of Hiroshi and further in view Mori also suffers from the above improper assertion of prior art.

For the reasons set forth above, the Applicants respectfully submit that the Claims 1-10, presently pending in this application, are in condition for allowance over the art of record. This Amendment is considered to be responsive to all points raised in the Office Action.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections and earnestly solicit an indication of allowable subject matter. Should the Examiner have any remaining questions or concerns, the Examiner is encouraged to contact the undersigned attorney by telephone to expeditiously resolve such concerns.

Respectfully submitted,

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Vangelis Economou, Reg. No. 32,341
c/o Ladas & Parry
224 South Michigan Avenue
Chicago, Illinois 60604
(312) 427-1300

DOCKET: CU-2258 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application:	Seung Ho HONG et al.	]
Serial No:	09/607,014	] GRP ART UNIT: 2871
Filed:	June 29, 2000	] Ex.: Andrew M. SCHECHTER
For:	REFLECTIVE TYPE-FRINGE FIELD SWITCHING MODE LCD	]

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SPECIFICATION - MARKED-UP VERSION

Please amend the last paragraph of page 2 in the Specification (page 2, line 26 to page 3, line8) as set forth below:

"First, referring to FIG. 1, when voltage difference does not occur between the counter electrode 11a and the pixel electrode 11b, the liquid crystal molecules (not shown) are arranged so that the rubbing axes R1, R2 and the long axes thereof are parallel. Consequently, a natural light 22a becomes an incident light 22b proceeding to the same direction as a polarization axis 18a by passing through a polarizer 18. Thereafter, the direction of the incident light 22b is not changed while passing through the liquid crystal layer 17 which the rubbing axes R1, R2 and the long axes of the liquid crystal molecules are arranged side by side thereon. The incident light 22b which has passed through the liquid crystal layer 17, is at an angle of 45° with the fast (or slow) axis of the λ/4 plate 19, thereby becoming a right-circularly polarized light 22c passing through the λ/4 plate 19. The right-circularly polarized light 22c is reflected b a reflective plate 20, thereby becoming a **[right-circularly]** **left-circularly** polarized reflected light 23a."

Please amend the last paragraph of page 12 (lines 10-20) in the Specification as set

forth below:

"Then, a natural light 200a, as illustrated in FIG. 6, becomes an incident light 200b equal to the polarizing axis by passing through the polarizer 70. The incident light 200b which has passed through the polarizer 70 passes through the liquid crystal layer 65 having retardation of $(2n+1)\lambda/4$, and therefore the proceeding direction thereof is changed, thereby becoming a right-circularly polarized incident light 200c. The right-circularly polarized incident light 200c is reflected by the reflective plate 75, thereby becoming a reflected light 210a being **[right-circularly]** **left-circularly** polarized."

Please amend the second paragraph (i.e., lines 19-27) of page 14 in the Specification as set forth below:

"FIG. 10 of **[accompanying]** **the** drawings is a graph showing reflectance in accordance with retardation ($d\Delta n$) in a reflective type FFS-LCD according to **[this]** **an embodiment of the present** invention. According to FIG. 8, for example when λ is 570 nm, the **[points which]** reflectance **points** **[are]** **vary periodically between** 0 and 0.9 **[show periodically]** **as shown in Fig. 10**. At **[this time, at]** the **reflectance** point of 0**, the** retardation is $(2n+1)\lambda/4$**,** and at the **reflectance** point of 0.9**, the** retardation is **[$2n/\lambda$]** **$2n\lambda/4$**. Consequently, when retardation of the liquid crystal layer 65 is $(2n+1)\lambda/4$ **(i.e., at each reflectance point of 0)**, a display can be realized without the $\lambda/4$ plate."

Please amend the second paragraph of page 15 (lines 7-12) in the Specification as set forth below:

"First, in reflective type FFS-LCD, retardation ($d\Delta n$) **[uses material having retardation of]** **is caused to become** $(2n+1)\lambda/4$ **[as]** **in** the liquid crystal layer.

Consequently, the liquid crystal layer serves as a conventional λ/4 plate, thereby not requiring to form an extra λ/4 plate. Accordingly, intensity of light increases and price decreases."

DOCKET: CU-2258 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Serial No:	09/607,014	] GRP ART UNIT: 2871
Filed:	June 29, 2000	] Ex.: Andrew M. SCHECHTER
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CLAIMS - MARKED-UP VERSION

Please cancel Claim 3 and amend Claims 1 and 7 as set forth below:

1. **(Twice Amended)** A reflective type fringe field switching mode liquid crystal display ("a reflective FFS-LCD") comprising:

a liquid crystal layer having a plurality of the liquid crystal molecules;

a first substrate disposed on one side of the liquid crystal layer and a counter electrode and a pixel electrode formed on the first substrate for generating a fringe field to drive the liquid crystal molecules;

a second substrate disposed on the other side of the liquid crystal layer;

a first homogeneous alignment layer interposed between the liquid crystal layer and the first substrate and having a rubbing axis in a selected direction;

a second homogeneous alignment layer interposed between the liquid crystal layer and the second substrate, and having a rubbing axis in a selected direction;

a polarizer disposed on an outer surface of one of the first substrate and the second substrate, and having a selected polarizing axis; and

a reflective plate disposed on an outer surface of the other of the first

substrate and the second substrate,

wherein retardation **[occurs]** in the liquid crystal layer **is caused to occur in the absence of a quarter wave plate for retarding incident light** by **[(2n+1)]**$\lambda/4$ when the liquid crystal molecules in the liquid crystal layer are driven by the fringe field and wherein λ is **about 570 nm [the wavelength of light and n is zero or a positive number]**.

3. Please cancel Claim 3.

7. **(Twice Amended)** A reflective FFS-LCD comprising:

a liquid crystal layer having a plurality of liquid crystal molecules;

a first substrate disposed on one side of the liquid crystal layer and a counter electrode and a pixel electrode formed on the first substrate for generating a fringe field to drive the liquid crystal molecules;

a second substrate disposed on the other side of the liquid crystal layer;

a first homogeneous alignment layer interposed between the liquid crystal layer and the first substrate and having a rubbing axis in a selected direction;

a second homogeneous alignment layer interposed between the liquid crystal axis in a selcected direction anti-parallel to the rubbing axis of the first homogeneous alignment layer;

a polarizer disposed on an outer surface of one of the first substrate and the second substrate, and having a selected polarizing axis; and

a reflective plate disposed on an outer surface of the other substrate of the first substrate and the second substrate,

wherein the rubbing axes of the first and the second alignment layers are at an angle of 10 to 85° with a substrate projection line of the fringe field,

wherein retardation **[occurs]** in the liquid crystal layer **is caused to occur in the absence of a quarter wave plate for retarding incident light** by **[(2n+1)]**$\lambda/4$ when the liquid crystal molecules in the liquid crystal layer are driven by the fringe field and wherein λ is **about 570 nm [the wavelength of light and n is zero or a positive number]**.